

Epistemological Barriers to Radical Behaviorism

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The historian and philosopher of science Gaston Bachelard proposed the concept of epistemological barriers to describe the intellectual challenges encountered by scientists in their work. In order to embrace novel ways of approaching a problem in science, scientists must overcome barriers or obstacles posed by their prior views. For example, Einsteinian physics presents scientists with claims that space is curved and that time and space are on the same continuum. We utilize Bachelard's concept of epistemological barriers to describe the differences between the intellectual journeys students pursuing advanced studies face when attempting to accept cognitive psychology or radical behaviorism. We contend that the folk psychological beliefs that students typically hold when entering these studies pose less challenge to cognitive psychology than to radical behaviorism. We also suggest that these barriers may also partly be involved in the problematic exegesis that has plagued radical behaviorism. In close, we offer some suggestions for dealing with these epistemological barriers.

Key words: radical behaviorism, epistemological barriers

Gaston Bachelard (1884–1962), philosopher and historian of science, argued that science moves forward not in a continuous advance, but rather in upheavals distinguished by ruptures in current scientific thought. These breaks lead to novel approaches to scientific problems and often to science as a whole (Tiles, 1984). His view that science rarely proceeds in a continuous fashion, but usually consists of sharp breaks, is consistent with Kuhn's (1970) views of normal science being periodically punctuated by revolutions. However, Bachelard also argued that scientific progress is particularly dependent upon the liberation of science from restrictive ways of previous thinking. Bachelard did not propose practical steps that would be beneficial to overcome such barriers, but we argue that his position has a role to play in understanding the extent to which theories gain acceptance in psychology.

Although Bachelard did not make the distinction between overcoming epistemological barriers to *understanding* a position and overcoming barriers to *accepting* a position, we believe that this distinction is important. In this paper we focus on epistemological barriers to accepting a position, although we admit that a reason for failing to accept a position may be that one does not understand that position. Barriers to understanding may be created from the position not being conveyed clearly or from the audience not having prerequisite knowledge needed for understanding the position. We believe that the clarity of presentation is not usually the issue in psychology and also believe that there is rarely much prerequisite knowledge needed to initially understand positions in psychology (e.g., as opposed to the advanced mathematics required to understand much of contemporary physics). Thus, we focus on epistemological barriers to acceptance because we believe that these are more relevant in psychology.

According to Bachelard, an historical analysis follows a concept (e.g., mass) across time, examining how the concept is altered as scientific knowledge changes. Concepts and beliefs, however useful, have limitations that

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restrict the scientist's ability to make progress on his or her problems. Concepts have limitations in that they selectively focus attention and contain presuppositions regarding what is plausible or even possible. For example, at one point in the development of physics, viewing space only in Euclidean terms restricted scientific progress (Tiles, 1984). Concepts and beliefs, then, may serve as epistemological barriers that impair the ability of scientists make progress in their subject matter.

R. C. Smith (1982) states that Bachelard defined epistemological barriers or obstacles¹ in the following way: "Any knowledge that is not questioned or that does not lead to further questions, any notion that blocks the fundamental questioning activity of science, is an epistemological obstacle" (p. 36). These obstacles or barriers are not external to the scientist, but are held by the scientist in his or her web of belief (Jones, 1991). Barriers to scientific knowledge are often found in presuppositions that rarely come under scrutiny. It is often these supposedly "obvious" suppositions that need to be examined and questioned, (Tiles, 1984) because, for Bachelard, the scientist comes to his or her subject matter "thoroughly prejudiced, marked by preconceived ideas and values" (Jones, 1991, p. 79). Other philosophers of science essentially agree with the limitations placed on scientists by their prior and often implicit commitments (Kuhn, 1970; Lakatos, 1970; Laudan, 1977; Popper, 1963). Popper, for example, asserts that scientific theories often arise out of folk beliefs, but theorists often need to abandon these beliefs and concepts as scientific knowledge grows.

Obstacles that Bachelard outlined in his work included the use of words, images, and hypothesized entities involved in scientific explanations. For

example, the concept of *sponginess* was offered in the 18th century as an explanation for some of the properties of air and characteristics of electricity (R. C. Smith, 1982). A contemporary understanding of air and electricity, however, suggests that the construct of sponginess not only fails to provide any useful explanation of either phenomenon, but when adopted, this construct can interfere with more successful accounts that rely upon other key constructs (Jones, 1991; Tiles, 1984). This is not to say that these currently successful concepts will not, in turn, eventually be shown to have their own limitations. All concepts have limitations, but nonetheless concepts are necessary in science. Science will always contain some assumptions, because all things cannot be simultaneously questioned. On the other hand, failing to question some assumption or to see the possibility of limitations in some concept can eventually serve as an epistemological barrier in science when the utility of these assumptions and concepts has been completely mined.

Adopting a Copernican account of the solar system also required scientists to surmount epistemological barriers that had been set in place by the Ptolemaic tradition (Ravetz, 1990; Schuster, 1990). The Copernican system faced epistemological obstacles because it required an adoption of a set of beliefs contrary to the previous interpretation of their experience of the world. The Copernican system stipulates that the earth revolves around the sun and around its own axis, but resulted in the seeming anomaly that no one directly perceived these movements. A common argument was that if the earth actually were moving, there would be a constant wind, and because there was no wind, the earth's position must be fixed. To resolve this paradox, the Copernican system suggested that there were essentially two heavens, one more locally around the earth (the atmosphere) that moved with the earth, and a second: the more empty space in

¹ Throughout this paper, the terms *epistemological barrier* and *epistemological obstacle* will be used interchangeably.

which the earth and the other planets rotated. This, in turn, required people to challenge their views of a single, un-moving, and unchanging Heaven. A final epistemological obstacle to the Copernican system is to be found in its displacement of the earth as the center of the universe. To reject this geocentric view and accept that the earth was just one among several planets revolving around one of many suns, contemporary scientists had to reconcile any beliefs they held about the divine placement of the earth and then replace those with an earth that has a less extraordinary location than they had previously believed. These epistemological obstacles to accepting the Copernican, heliocentric account were difficult for many to surmount and likely prevented many from shedding their more commonsensical and widely accepted views in favor of a more accurate account. Ultimately, of course, these epistemological barriers were surmounted, and this led to other advances in astronomy. This example is useful because epistemological barriers can occur at the level of very general "philosophical" or metaphysical views regarding what is plausible and what the world is like (O'Donohue, 1989).

A third example can be seen in the epistemological barriers that must be overcome to accept evolutionary theory over biblical creationism (described in Hodge, 1990). To adopt a Darwinian view, a person may feel that he or she had to set aside the popular belief that the source of creation of all species was the biblical Christian god. Darwinian theory also removed humans from their special place at the pinnacle of the biblical hierarchy of animals, stipulating that the processes of evolution through natural selection that operated on all animals had operated, and continues to operate, on humans as well. These barriers, though large, were eventually overcome by many, replacing a creationist theory of speciation with an account based on natural se-

lection.² Others, although they understand the elementary concepts of evolutionary theory, continue to reject this position.

In the scientific community there was considerable difficulty overcoming essentialist philosophies and typologically defined concepts of different species (Denton, 1985). Prior to Darwin, scientific belief held that the species were separate and classified based on structural properties specific and essential to these groups (e.g., birds, fish, reptiles). These classes were regarded as unique and as having no kinship relationship with the other classes of animals. This taxonomy further stipulated that such classes of species had existed since the beginning of life on earth. According to most creationist accounts, the species were fixed because God would only make a perfect creation. The notion of an ever-changing species contained in Darwin's account ran directly counter to this theological view. Further, the theological account could offer an explanation of the complexity observed in organic life forms. In contrast, evolution seemed to require a "blind watchmaker," to use Dawkins' (1986) colorful phrase, that appeared to less plausibly account for the complexity of life forms. Finally, Darwinian evolutionary theory proposed that these classes all evolved from a single line. Fish and reptiles, then, were related, even though their current structure showed little or nothing in common. In order for scientists to accept this radical new theory, they had to overcome the assumption that species are wholly distinct, and replace that with a set of beliefs that species are all related and have evolved from a similar origin.

In this paper we will focus on Bachelard's notion of epistemological obsta-

² We recognize that many biologists and evolutionists do not necessarily deny the existence of God (e.g., Denton, 1985). We pose this example to illustrate the sizable epistemological barriers met by a theory that would be difficult for prospective adherents to overcome in order to replace preexisting beliefs in creationism.

cles and its implications for psychology. Specifically, we will discuss how the use of this concept can shed some light on the initial reaction to two general approaches in psychology: cognitive psychology and radical behaviorism. We describe how the student of psychology comes to the field with commitments rooted in folk psychological beliefs. We further detail the process of overcoming the fewer epistemological barriers put to a student by cognitive psychology and contrast these with the barriers faced by a student studying radical behaviorism. Thus, although Bachelard used the concept of epistemological barriers to explain what hinders the cutting edge of science, we use it to explain the other end of the path: the extent to which a student initially finds an approach acceptable or problematic.

THE BEGINNING OF THE PATH: FOLK PSYCHOLOGY

Folk psychology "usually designates a *theory* about mental phenomena that common folk allegedly hold, a theory in terms of which mental concepts are understood" (Goldman, 1993, p. 15). That is, it is the view that all people behave as amateur psychologists in that, in order to function socially, we need at least to have some views regarding behavior to predict how others are likely to behave and particularly how they are likely to respond to our behavior. Although the status of folk psychology as a philosophical or scientific theory has undergone considerable debate (see, e.g., Charter & Oaksford, 1997; B. R. Smith, 1997), several proponents suggest that folk psychology as an explanatory system is not likely to be eliminated in the near future (Horgan & Woodward, 1990; Richards, 1997). Churchland (1991) states that folk psychology, like other folk theories of other branches of science such as physics and biology, is for some "a framework of concepts, roughly adequate to the

demands of everyday life, with which the humble adept comprehends, explains, predicts, and manipulates a certain domain of phenomena" (p. 51). Churchland calls this a *folk theory*. Churchland contrasts this position of folk psychology with that of a scientific theory in that folk psychology is not intended to support causal explanations, is not intended to evolve with time, and cannot be shown as faulty through empirical findings. To some, then, folk psychology is an aspect of everyday living and is not intended to be taken as a scientific theory. Similarly, B. R. Smith (1997) states that,

Folk psychology is part of common sense. It is that part we use to make sense of our own and other people's work and deeds. We rely on it to predict what people will do and say on particular occasions, and to make them intelligible even when what they do and say surprises us. (p. 32)

Folk psychology is "a network of principles which constitutes a sort of common sense theory about how to explain human behavior" (Horgan & Woodward, 1990, p. 399). This folk psychological position stipulates that (a) causes for behavior are mental and human behavior is "systematically caused by, and explainable in terms of [a person's] beliefs, desires, and propositional attitudes" (Horgan & Woodward, p. 399); (b) mentalistic constructs (i.e., intention and motive) contain sufficient explanatory power to satisfactorily understand and explain human action (B. R. Smith, 1997); (c) behavior such as intentionality or purpose can be understood as originating within a person and does not need to be explained by events occurring in the environment; (d) human uniqueness and complexity (i.e., the richness of all the variation in human behavior and the complexity and subtlety of mental life) require an equally unique and complex set of explanations (e.g., human language requires more elaborate ways of explaining human behavior than that of other animals); (e) because humans are agents of their own behavior, folk psychology holds that behavior is not determined and that people can freely ex-

press willful actions; and (f) though not explicitly a part of folk psychology, but what we will suggest is a small step from it—"folk science"—group methodology is the proper way to study human behavior.

Causal Status of Beliefs

Regarding the causal status of beliefs and desires, Horgan and Woodward (1990) provide in their general description of folk psychology a characterization of the causal role of beliefs and emotions:

These principles provide a central role to certain propositional attitudes, particularly beliefs and desires. The theory asserts, for example, that if someone desires *p*, and this desire is not overridden by other desires, and he believes that an action of kind *K* will bring about that *p*, and he believes that such an action is within his power, and he does not believe that some other kind of action is within his power and is a preferable way to bring about that *p*, then *ceteris paribus*, the desire and the belief will cause him to perform the action of kind *K*. (p. 399)

Status of Intentionality and Motives As Explanatory and Predictive

Intentionality is another example of a putative mental cause of human behavior (B. R. Smith, 1997). In folk psychology, intentions regarding human acts are taken to be sufficient to bring about the act. To state that "I intend to wash my car this weekend" is enough to explain the behavior that follows and to predict that behavior. (As Hempel, 1966, pointed out, explanation and prediction are similar structurally but simply differ with respect to time; one is oriented to the past, the other to the future.) Because causes are central to explanation and prediction and because beliefs, desires, motives, and intentions are viewed as causes of behavior, than these figure centrally in explanations and predictions regarding human behavior.

Moreover, success with predictions based on intentions and other beliefs is held as one of the great strengths of folk psychology. An additional attractive property of these predictive suc-

cesses is the ease with which these successful predictions can be accomplished. No special instruments or training is needed for one to predict, for example, that if Joe intends to watch the game tomorrow, then (*ceteris paribus*) Joe will watch the game tomorrow.

Importance of Internal Causes for Behavior

Because mental events are thought to play the most important causal roles in human action, there is little reason to move beyond the inner life of the person as the source of explanations for his or her behavior. Folk psychology takes these internal causes to be so important, ubiquitous, proximate, and powerful that there is little emphasis upon environmental or external causes of human behavior.

There is empirical support for the claim that, in general, individuals emphasize internal causes in explaining human behavior. Social psychologists coined the term *fundamental attribution error* to describe the tendency to place greater emphasis on internal explanations for behavior rather than on external ones (Jellison & Green, 1981). Jellison and Green examined the possibility that the fundamental attribution error was typical of how individuals ascribed causality for their own and others' behavior. They found that internal explanations for behavior and its causes are common and serve to minimize the role of environmental variables. Even when environmental manipulation yields differential responding by subjects, they maintain internal attributions as to the cause of their behavior (Batson, Harris, McCaul, Davis, & Schmidt, 1979). Dubois (1988) demonstrated the presence of these beliefs in elementary and high school students. In a task to solicit their teacher's approval, students provided more internal reasons for their own behavior and that of other students. When asked to submit responses that would gain their teacher's disapproval, more exter-

nal variables were used to describe these behaviors. Undergraduate responses to clinical phenomena also demonstrate the presence of folk psychological beliefs. Hayes (1987) described undergraduates' responses to common clinical situations; after reading the description, the students provided reasons for the client's behavior. Their responses gave causal status to the thoughts and feelings of the client. In addition, they reported internal explanations for their own behavior in these types of situations.

A Complex and Unique Set of Explanations

For a folk psychologist, because human behavior is so rich with respect to the diverse things people do and the multitude of reasons for doing such, it requires a plethora of different kinds of explanations. A simple set of explanatory principles would not do justice to the diversity and complexity of how people interact with the world, either alone or in groups. From a folk psychological position, to attempt to reduce the causes of action to a small set of explanatory mechanisms, particularly a small set that has a large degree of overlap with explanations of the behavior of nonhuman animals, would deny the uniqueness of human existence and would not do justice to the complexity of human behavior.

Free Will

Free will is assumed to exist in folk psychology. It is thought that it is unnecessary to causally account for the origins of the mental causes themselves (Charter & Oaksford, 1997; B. R. Smith, 1997). Therefore, mental events are assumed to arise freely or under the volition of the person who experiences them.

Science and the Scientific Method

An additional obstacle, although not explicitly stated in folk psychology, concerns the nature of the scientific

methods used to understand human behavior. Folk psychology is largely a commonsense, culturally accepted account of the natural world. We propose that there also exists folk views regarding science and scientific methods. We suggest that this view contains the belief that scientific research is best accomplished by group experimental designs. This image of science is perpetuated in the media through examples in areas outside psychology, such as medical or sociological research, and in large psychological studies of behavior, such as the Kinsey report. We suggest that this image of science consists, in part, of research with large groups of subjects.

Folk Psychological Barriers for the Student of Scientific Psychology

Folk psychological explanations of human behavior constitute epistemological barriers. They are what many people have used, and have witnessed other people use, to account for human behavior for the first 20 years or so of their lives. Moreover, during these formative years they also have witnessed very little challenge to these accounts.

Next, we will examine epistemological barriers that are met when one moves from folk psychology to more formal, academic positions regarding human behavior. We suggest that most individuals who pursue formal education in the behavioral sciences begin as folk psychologists. Our argument is based on the premise that this initial folk psychology has influence in constructing epistemological barriers to the more systematic or formal positions that the student encounters in the academy. Folk psychology, perhaps inchoately, initially defines what is plausible and implausible.

FROM FOLK PSYCHOLOGY TO COGNITIVE PSYCHOLOGY: A PATH OF MINIMAL RESISTANCE

Baars (1986) states, "The term 'cognitive psychology' is used to specify a

field within human experimental psychology that applies an information-processing metaphor to human functioning" (p. 5). Moreover, cognitive psychologists "observe behavior in order to make inferences about underlying factors that can explain the behaviors" (p. 7). Lycan (1990) elaborates, defining cognitive psychology as

the view that (i) psychologists may and must advert to inner states and episodes in explaining behavior, so long as the states are construed throughout as physical, and (ii) human beings and other psychological organisms are best viewed as in some sense *information-processing* systems. (p. 8)

Cognitive psychology examines the process by which people extract information about their world, construct their experience of the world, and synthesize this information into cognitive structures that direct behavior. Conscious states are given causal status by many cognitive psychologists. Sperry states, "*subjectively experienced conscious qualities*, viewed as irreducible emergent properties of brain processing, could be looked at as objective interactive causal influences" (1995, p. 42). Concepts such as *beliefs*, *desires*, and *attitudes* are supplemented with more technical constructs such as *schema* and *attributions*. Schema and attributions, along with beliefs, are hypothesized to function to cause humans to behave in certain ways. Although Donald Norman (in Baars, 1986) acknowledges the concept of schemata as having been "criticized as being fuzzy and sloppy," he states, "The concept of the schema is very important because it says that the memory structures are organized into small units of information" (p. 386). The concept of schemata has influenced the development of the fields of cognitive psychology and its offspring, cognitive therapy.

In the area of psychopathology research, defective schemata are viewed as being responsible for a variety of behavioral disorders such as depression, mania, panic disorder, and phobias (see, e.g., Beck & Weishaar, 1989; Craske & Barlow, 1993; Young, Beck,

& Weinberger, 1993). These cognitive schemata are considered to be causal variables in depression by Young et al.: "when we change depressive cognitions, we simultaneously change the characteristic mood, behavior, and (we presume) biochemistry of depression" (p. 241). Similarly, Ellis and Grieger (1977) state, "people largely control their own destinies by believing in and acting on the values and beliefs that they hold" (p. 3).

Causal Status of Beliefs and the Explanatory and Predictive Status of Mental Events

Because mental events such as beliefs, desires, and intentions are still regarded as having important causal status, cognitive psychology does not require the student to fundamentally challenge his or her original beliefs regarding the causal status of mental events. Moreover, cognitive psychology, because it embraces intentions as causal constructs, can appropriate the predictive success of folk psychology. Although cognitive psychology seeks a more detailed and technical analysis of, for example, the intention-behavior connection, it has no fundamental objection to predictions based upon a prior statement of intentions (Jackson, 1996). Thus, with respect to the first two assumptions of folk psychology (that causes for behavior are mental, and that these mental events are sufficient to explain and predict human action), cognitive psychology presents no barriers to overcome in order to adopt this framework.

Importance of Internal Causes for Behavior

The third contention, that behavior can be understood to originate inside a person and is not explained by environmental causes, also goes unchallenged by cognitive psychology. Horgan and Woodward (1990) also have remarked that "cognitive psychologists have developed extensive and detailed theories about visual perception, mem-

ory, and learning that employ concepts recognizably like the folk-psychological concepts of belief, desire, judgment, etc." (p. 401).

The study of artificial intelligence, a central area of research for cognitive psychologists, can be used as an example. Artificial intelligence, "the process of getting computing machines to perform tasks that would usually be taken to demand human intelligence and judgment" (Lycan, 1990, p. 9), requires the researcher to assert that external influence, at least to the computer, takes place only in data input. The key operations that process and transfer the raw input into more valuable outputs occur inside the computer. Because artificial intelligence is proposed as a model of human intelligence, it exemplifies the cognitive psychologist's assumption of how the key process of information processing occurs entirely within the organism.

A Complex and Unique Set of Explanations

With regard to the fourth claim of folk psychology, the need for a unique and complex set of explanations (relative to nonhumans), again cognitive psychology appears to place no obstacles for the student to surmount. There is nothing explicit or implicit in cognitive psychology (or in its offspring, cognitive therapy) to suggest that human behavior should be captured by a limited set of principles, many of which are shared by nonhuman animals. Rather the opposite is thought to be the case. First, humans are thought to have unique cognitive abilities, and therefore unique kinds of explanations are necessary to account for human behavior. Second, that thoughts or schemata cause behavior can be taken as a broad principle, but the specifics regarding, for example, the types of schemata that cause different behaviors are many.

Free Will

The epistemological challenge to the folk psychological assumption of free

will is a more complex one. Sperry (1995) states that "the new cognitivism retains both free will and determinism" (p. 37). To the extent that cognitive psychology can adopt a compromise between two opposing systems, it may, however, represent a slight epistemological barrier. But to the extent that it still contains elements of free will, the size of the barrier is reduced.

Science and the Scientific Method

The final assumption implicit in folk psychology, that of a widely held image of science relying on group designs, remains unchallenged in cognitive psychology. Basic cognitive researchers rarely use single-subject experimental designs. Cognitive therapy researchers have been found to rely on group studies to describe general tendencies in the population of interest (O'Donohue & Houts, 1985).

Summary of Barriers to Cognitive Psychology

With respect to the six dimensions regarding human behavior held in folk psychology, cognitive psychology appears to challenge only one: free will. Even this epistemological barrier may not be so great, because it appears to contain a softer determinism. In this way cognitive psychology can be viewed as the path of least resistance to students who study human behavior: They are required to set aside very few of their initial folk beliefs about why people behave as they do and how to properly study human behavior.

Although we depict cognitive psychology as a path of minimal resistance with respect to epistemological obstacles, this is not to say that there are no obstacles to accepting cognitive psychology. To follow this path, one must first assume that beliefs, desires, attitudes, intentions, motives, and the like are amenable to scientific study. According to some authors (cf. Greenwood, 1991; B. R. Smith, 1997), one may be required to abandon a folk psychology theory in order to even begin

a scientific study of human behavior. This epistemological barrier, although it may indeed be an obstacle of sorts, is not as difficult to surpass as it would be to deny the causal status of thoughts altogether.

THE ROCKY PATH TO RADICAL BEHAVIORISM

In this section we describe the epistemological barriers that must be surmounted to accept a radical behavioral account of human behavior. The minimal resistance met by students who move from folk psychological beliefs to cognitive psychology is contrasted with the number of significant obstacles students face on the path to radical behaviorism. That there are multiple epistemological barriers to radical behaviorism does not presume that this is the correct or incorrect path one should pursue, nor does this description suggest that those who do not make the additional hurdles to radical behaviorism are intellectually naive or lackadaisical. We present the argument that many such barriers do exist, and that these barriers can make it more difficult for individuals to accept radical behaviorism.

We are not the first to recognize that accepting radical behaviorism is not without difficulty. Skinner (1975) noted that many challenges face a person interested in studying behavior analysis. Skinner attempted to "analyze some of the diversions peculiar to the field of human behavior which seem to have delayed our advance toward the better understanding we desperately need" (p. 42). Skinner outlined some of the areas in which people become hampered in their pursuit of a scientific analysis of human action (see also Skinner, 1953). Skinner (1975) closed his discussion of the difficult way to behaviorism with, "I wish to testify that, once you are used to it, the way is not so steep or thorny after all" (p. 49). Although we agree, the difficulty with the number of these barriers may

prevent students from ever becoming "used to it."

These epistemological barriers may also serve to partially explain the problematic exegesis that has plagued radical behaviorism. For example, MacCorquodale (1970) provided a long list of misrepresentations of Skinner's assertions in Chomsky's review of Skinner's *Verbal Behavior*. It is important to emphasize that in exegesis the issue is not substantive disagreements regarding issues but simply the degree to which the representation of the position is complete and accurate. Todd and Morris (1992) have also documented numerous misrepresentations of radical behaviorism and suggest that these have "caused its contributions to the understanding of behavior to be systematically ignored or denied" (p. 1441). We suggest that epistemological barriers increase the probability of problematic exegesis to the extent that when they conflict with prior beliefs they can render radical behaviorism more difficult to accept and therefore more prone to caricature.

Causal Status of Beliefs

The first assumption of folk psychology, that causes for behavior are mental, presents the first epistemological barrier. In radical behaviorism these cognitive events are understood to be behaviors that the organism emits covertly. However, they cannot by themselves explain behavior (e.g., Hayes & Brownstein, 1986), but rather, as Skinner repeatedly pointed out, they are more behavior to be explained. For the radical behaviorist, "the bodily conditions [that] we feel are *collateral products* of our genetic and environmental histories. They have no explanatory force; they are simply additional facts to be taken into account" (Skinner, 1975, p. 43). Beliefs, desires, attitudes, and intentions cannot be directly manipulated and thus cannot be shown to have a causal role in behavior. The ability to manipulate environmental variables directly allows the behavioral re-

searcher to demonstrate prediction and control in a way that internal constructs such as belief and thoughts cannot.

Status of Intentionality and Motives As Explanatory and Predictive

Skinner (1975) stated that (as James suggested), "Perhaps we do not strike because we feel anger but feel angry because we strike" (p. 43). For intention to enter a causal analysis, it would have to be explicated as an antecedent event for the behavior that followed it. However, this account could not by itself explain how the intention (a covert behavior) occasioned the overt response it preceded and would be incomplete. A radical behaviorist rejects these collateral and internal explanations as adequate explanations in favor of an environmental account. "We both strike and feel angry for a common reason, and that reason lies in the environment. . . . Moreover [feelings] are *immediately* related to behavior, being collateral products of the same causes, and have therefore commanded more attention than the causes themselves, which are often rather remote" (Skinner, 1975, p. 43). Denying the explanatory status of purpose and intention is directly contrary to a folk psychological account of the importance of these concepts in causing human action.

Moreover, radical behaviorists have three problems with the predictive successes of accounts based on cognitive notions such as intentionality. First, the successes are alleged. There is no clear case regarding the extent to which these are in fact accurate. Certainly, at least in an informal manner, we can recount instances in which these fail (e.g., intending to lose weight). Second, these ignore important environmental antecedents. The question of what caused the intention, for example, will eventually lead to environmental events. Third, these cognitive events are not directly manipulable and therefore cannot be experimentally shown to play a causal role and cannot be a practical point of intervention to develop an effective technology of behavior.

Importance of Internal Causes for Behavior

An additional epistemological barrier is met, given the folk-psychological belief stipulating that behavior can be understood as originating within a person rather than in the environment. Behavior is to be explained by the radical behaviorist as caused by environmental events, not by events within the individual. Although we often look inside a clock or other machine to figure out how it works, and this is the way much of biology operates, humans are not directly analogous to understanding a machine's or body's process by its parts (Skinner, 1975). Skinner (1990) noted that the concepts still present in cognitive psychology that lead to the study of mental life are an unfortunate by-product of an unchanged vernacular. Radical behaviorists replace language that requires us to look inside the organism with an analysis that leads to a description of environmental contingencies.

The radical behaviorist must assume that it "is the *organism as a whole* that behaves" (Skinner, 1975, p. 44). Behaviors such as thoughts, beliefs, and desires must be examined in relation to the organism's environmental setting. The behavioral scientist cannot look inside a person to see why he or she does something. He or she must look to the external environment to attempt any description or possible explanation, to "explain the hitherto inexplicable and hence to reduce any supposed inner contribution which has served in lieu of explanation" (Skinner, 1975, p. 47). Radical behaviorists not only reject the folk psychological belief that explanations can reside inside the organism, but even hold this commonsense assumption accountable for the lack of scientific progress in psychology. "We have not advanced more rapidly to the methods and instruments needed in the study of behavior precisely because of the diverting preoccupation with a supposed or real inner life" (Skinner, 1975, p. 46). Requiring the student to look to the

environment for the origins of behavior and not allowing explanations to reside inside a person represent a sizable epistemological barrier to accepting radical behaviorism.

A Complex and Unique Set of Explanations

One of the greatest epistemological barriers faced by radical behaviorism is that, like Darwinian evolutionary theory, it removes humans from a special place in the hierarchy of living organisms. Humans are taken to be similar to other animals in many important ways: As a species we are subject to the selection of physical attributes through evolution and the contingencies of survival, and as individuals our behaviors are subject to selection by the consequences those behaviors have in our ontogenic evolution (Skinner, 1981). Therefore, the number of basic kinds of explanations possible for human behavior involve a few basic principles, with selective contingencies being at the core of these. The folk psychological belief that there is a large number of different kinds of explanations for human action is rejected. All behavior is understood to be a function of environmental variables, and behaviors are selected based on their consequences (i.e., through contingencies of reinforcement and punishment). This analysis does not change based on the seemingly complex act a person (or any other animal) has performed.

Radical behaviorists argue that the fact that humans possess unique abilities such as language does not subvert the position that human behavior is analyzable in the same way as all other animal behavior. Language is simply a type of behavior (Skinner, 1957); it is subject to the same contingencies of reinforcement as all other behavior. The same goes for thoughts and feelings; they certainly exist, but they are behaviors, no more and no less (O'Donohue & Szymanski, 1996). They do not have unique causal status as such in the analysis of behavior.

A goal of radical behaviorists is the simplification of seemingly complex behavior into a parsimonious and powerful set of analytic terms. Skinner sought to produce an economical and general set of principles with which the apparent complexity of human experience can be understood using the same principle-based analysis on all occasions (Guttman, 1977). This analysis denies that there is something unique about human experience and mental life that requires the scientist to step outside a radical behavioral analysis or to amend it in order to consider human behavior. Requiring a student to accept that there exists a three-term contingency analysis, by which all of his or her behavior may be understood, can be seen as too quickly denying the richness of human experience to the point that the student rejects radical behaviorism without giving it further consideration. Skinner, however, never intended to deny that human experience can feel rich or complex (as an example, see quote in the following paragraph). Skinner simply wanted to develop an economical analysis that would ultimately lead to practical technologies for bettering the human condition (e.g., Skinner, 1971).

Free Will

Another epistemological barrier to accepting a psychology of radical behaviorism lies in its explicit acceptance of determinism. Contrary to the folk psychological belief that behavior is not determined and that people can freely express willful actions, radical behaviorists contend that all behavior is determined. Skinner stated, "A behavioristic analysis does not question the practical usefulness of reports of the inner world that is felt and introspectively observed. They are clues (1) to past behavior and the conditions affecting it, (2) to current behavior and the conditions affecting it, and (3) to conditions related to future behavior" (1974, p. 31). To study human behavior, the radical behaviorist asserts that

all behavior is caused by environmental variables. This statement can appear to deny so much of what is seemingly uniquely human and what people value that it is rejected outright. However, as Skinner describes, the fact that behavior is determined gives humans the opportunity to reciprocally affect their environment. Humans can arrange contingencies that will further the species and the values that members may hold, such as freedom and personal dignity. To "accept the task is to change, not people, but rather the world in which they live" (1975, p. 48). He states,

The practical problem in continuing the struggle for freedom and dignity is not to destroy controlling forces but to change them, to create a world in which people will achieve far more than they ever have achieved before in art, music, literature, science, technology, and above all in the enjoyment of life. (Skinner, 1975, p. 47)

Science and the Scientific Method

The final obstacle, the assumption of folk psychology that science is best accomplished through group design research, contrasts with the radical behavioral emphasis on the use of single-subject experimental designs. Skinner argued that the intense focus on single subjects provides the researcher the information psychologists generally want to know about organisms: The conditions under which an organism will emit a type of response and the likelihood of that event changing as a function of manipulating the environment (Skinner, 1956, 1963, 1971).

MAKING THE CASE FOR RADICAL BEHAVIORISM

Given that epistemological barriers posed by folk psychology often prevent students from accepting a radical behavioral position, it raises the question of how radical behaviorists can help students to overcome these barriers. Below we describe several strategies to help students overcome barriers to radical behaviorism.

Explicitly Acknowledging the Barriers Posed by Radical Behaviorism

We believe that it would be a pedagogical error for someone to attempt to present radical behaviorism in a way that does not quickly acknowledge the existence of the ways in which it conflicts with prior beliefs and common sense. Good teachers assess the student's starting position and engage the student at this point. We suggest that, at the outset, radical behaviorists acknowledge how their position deviates from what is commonly taken to be true so that the student does not conclude that, because he or she has found a way or ways in which radical behaviorism differs from his or her prior beliefs, he or she has the grounds to reject radical behaviorism.

Making the Case That These Barriers Are Not Insurmountable

Once these barriers are explicated we believe that there are three strategies that the radical behaviorist can undertake to help the student react to them. First, the case should be made that science often results in findings and concepts that contradict common sense. After all, if commonsense antecedent beliefs were sufficient to answer all our questions about a subject, we would not need to engage in science. Thus, one reason we engage in scientific behavior is because our current account is in some ways unsatisfactory. Science has often shown us that our folk account of some phenomenon is fundamentally wrong or contains basic concepts that are not useful. We have given some examples in the beginning of our paper from the history of science, but other examples are readily found (e.g., that matter consists of mostly empty space; that objects independent of their mass all accelerate toward the earth at a constant rate). Second, there should be a fair evaluation of both sides of the issue. For example, one can present evidence for the existence of free will and evidence for determinism. Skinner can be con-

sulted here, because he often does a wonderful job of presenting both problems with folk psychology and the advantages of the radical behavioral view. Finally, one of the more obvious ways to attempt to overcome the barriers to accepting a radical behavioral position is to have students contact the power of the analysis. Unfortunately, many undergraduate students can receive a baccalaureate degree in psychology without taking a class in learning theory that allows experimentation with animals. These classes can serve as clear demonstrations of behavioral principles. Having students conduct experiments with animals puts them in contact with the reinforcing properties of prediction and control. Experiments with rats and other animals would engage students in the application of behavior principles, and the situations that could be used are limited only by the imagination and effort of the instructor. Linking animal experiments to human clinical topics could prove to be a fruitful path to have students actively study a behavioral perspective.

CONCLUSION

We have traced the epistemological barriers that a student or scientist encounters on his or her path to the study of human behavior. The challenges on this path include understanding the causal status of beliefs and the explanatory and predictive status of intentionality and motives, accepting or rejecting internal causes for behavior, deciding to what extent a complex and unique set of explanations is required for human behavior, evaluating the role of free will, and deciding which scientific method should be utilized in the pursuit of the study of psychology. We suggest that with cognitive psychology there are fewer barriers, and what barriers that do exist are more easily overcome. Again, this is not to suggest that one theory is more accurate because the number of barriers is greater or fewer.

We also suggest that, as is conventionally accepted, the appraisal of the

worth of a psychological framework is partly a function of the evidence that can be marshaled in its favor or disfavor. However, less conventionally, we also suggest that the acceptance of a psychological position is also a function of the epistemological obstacles that must be overcome to understand or accept that position. Epistemological barriers can determine where the burden of proof lies and how great this burden is. If our analysis is correct, then the burden of proof lies with radical behaviorists. Radical behaviorism poses significant epistemological obstacles and as such is more likely to be rejected by any examination that is not protracted and that is not properly organized to explicitly recognize and deal with the epistemological barriers presented by folk psychology. The student should be forewarned that this is an approach that challenges many popular beliefs and may initially seem strange. Finally, because it is a principle of good pedagogy that the teacher contact the student at the place at which the student begins, radical behaviorists, in order to teach more effectively, should recognize that folk psychology presents these epistemological barriers to the student and should seek ways to address these barriers.

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